Technology from IETMs Research

CM FNC

NAVSEA Technical Manual Maintenance Activities

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ONR/Future Navy Capabilities

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- Re-organization of R&D allocation based on 13 Navy “spikes”
- Pin-point R&D investments to meet Navy needs and ensure transitions
- Capable Manpower FNC
  - EIPT S&T MGR: Ms. Jan Dickieson, ONR
  - Equip enabling objective
  - Objective-based OJT and Maintenance Support for Individuals and Teams

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Technologies

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- Device Models & Intelligent Tutoring
- Latent Semantic Analysis (LSA)
- Natural Language Processing
- Wearable Computers

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Device Model

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- An interactive graphical representation of the real system that responds to user actions and to simulated faults
- Can represent the physical appearance and/or functional architecture of the target system
- ReAct: Produces the device model and maintains the graphical representation as the model changes state.
- DIAG: Inspects the device model and generates intelligent diagnostic decisions and assessments.

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Conventional System Diagrams

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- Not mode/configuration specific
- Not responsive to user actions
- Do not reflect impact of malfunctions
- Require the end user to mentally simulate component behaviors in order to determine the state of system elements

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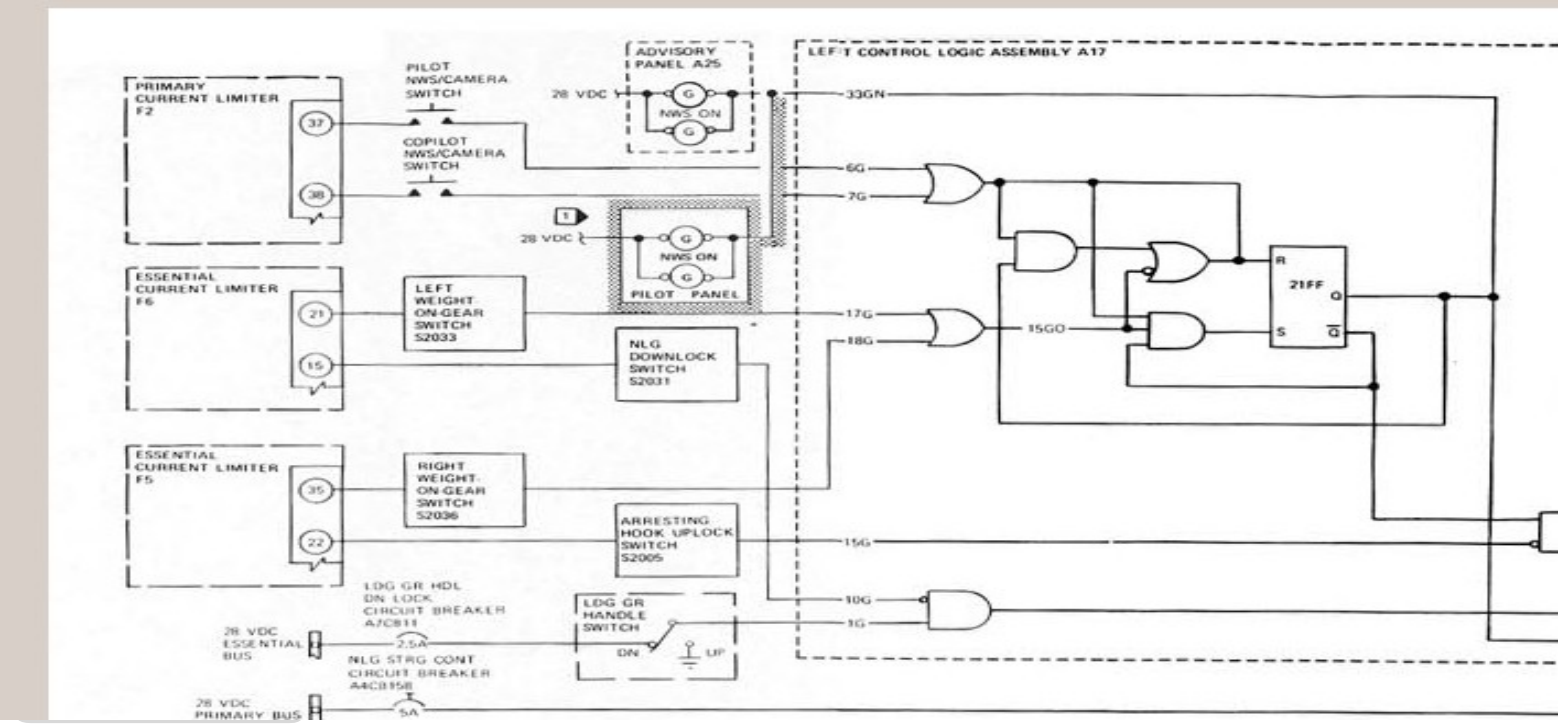
Static Display

- No interaction
- High memory load on technician



DIAG Diagrams

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- Models rather than drawings
- Respond to user actions
- Simulate element behaviors
- Portray normal or faulty conditions
- Constructed of functional objects rather than lines
- Support automated analysis of fault effects

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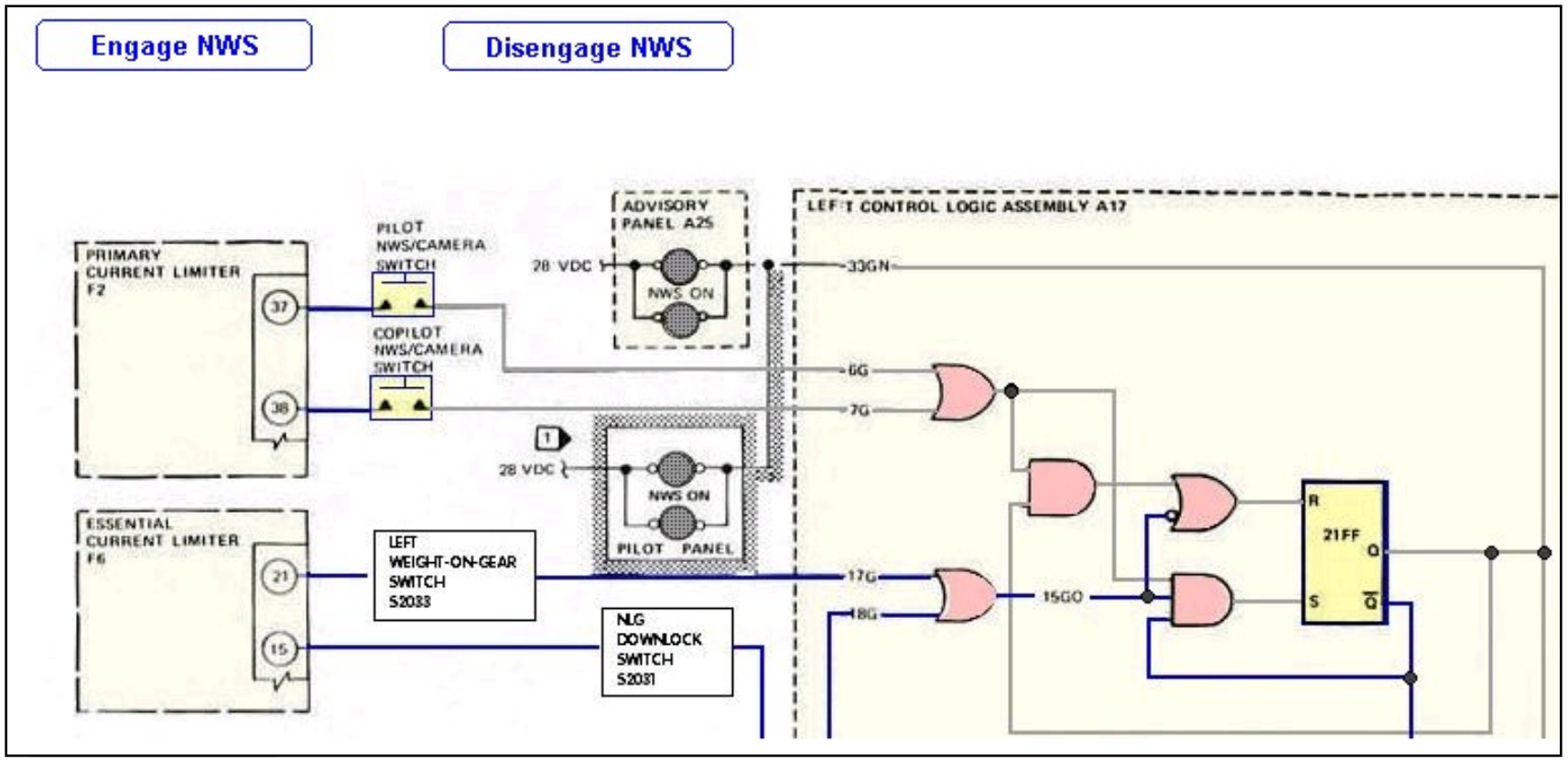
DIAG Responsive Display

- User can toggle back and forth for alternative



Latent Semantic Analysis (LSA)

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- Automatic machine learning technology
- Simulates human judgment of the similarity of meaning of two texts
- Improved search capability based on natural language queries and semantics - *not* just a keyword search
  - Vocabulary problem
  - Getting lost in “hyperspace”
- Determination of the optimum sequence of texts to support a given task.

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LSA: Examples

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- Similarity of random word pairs
  office - self .03
- Similarity of related word pairs
  amps - current .61
- Similarity of phrases
  "the radius of spheres" - "a circle's diameter" = .55
  "the radius of spheres" - "the music of spheres" = .01
- Meaning of a passage =
  meaning of wd_1 + meaning of wd_2 + … + meaning of wd_n

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Adobe Acrobat Query for "Fuse"

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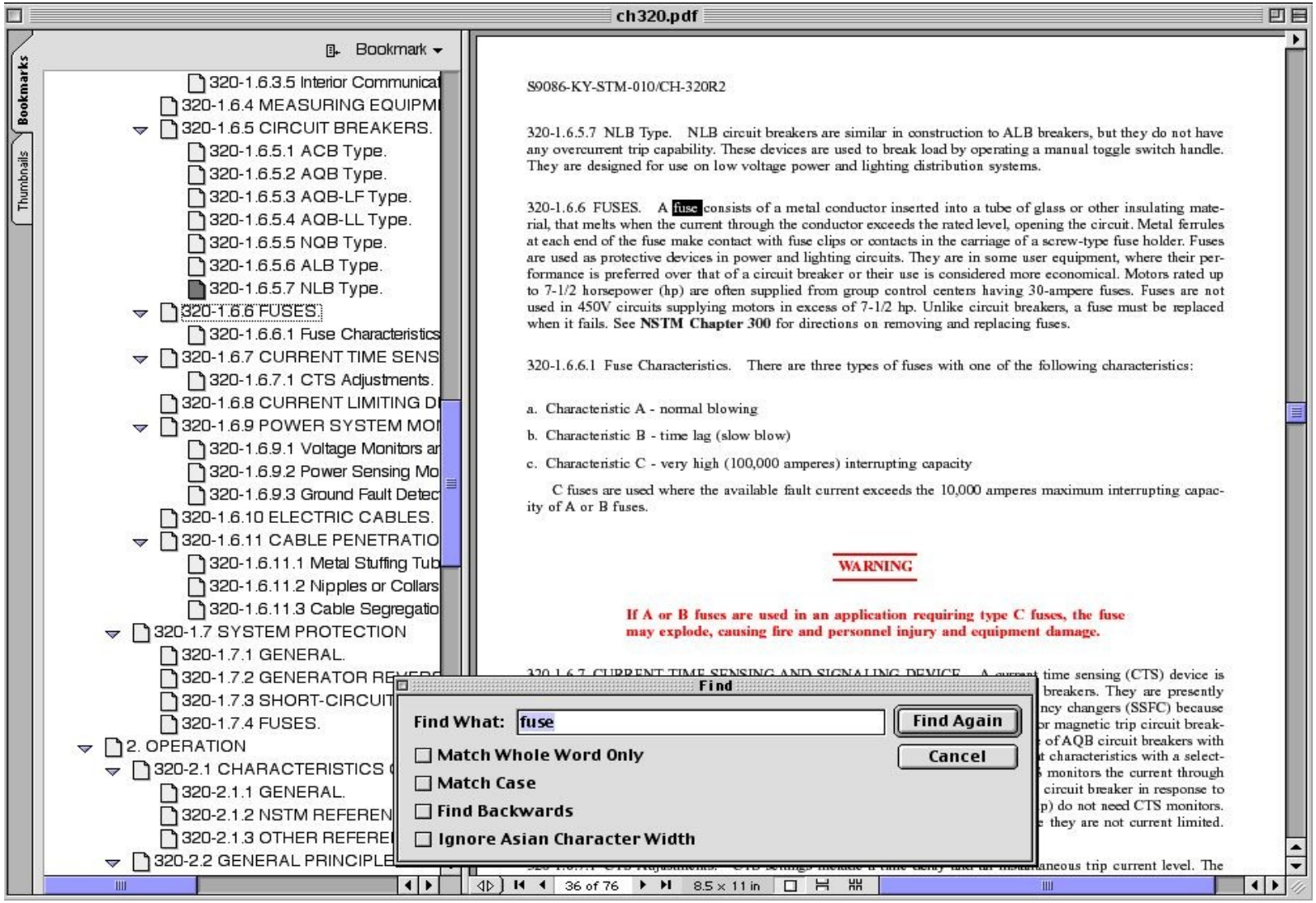
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320-1.6.4 MEASURING EQUIPM
320-1.6.5 CIRCUIT BREAKERS.
320-1.6.5.1 ACB Type.
320-1.6.5.2 AQB Type.
320-1.6.5.3 AQB-LF Type.
320-1.6.5.4 AQB-LL Type.
320-1.6.5.5 NQB Type.
320-1.6.5.6 ALB Type.
320-1.6.5.7 NLB Type.
320-1.6.6 FUSES.
320-1.6.6.1 Fuse Characteristics
320-1.6.7 CURRENT TIME SENS
320-1.6.7.1 CTS Adjustments.
320-1.6.8 CURRENT LIMITING D
320-1.6.9 POWER SYSTEM MO
320-1.6.9.1 Voltage Monitors ar
320-1.6.9.2 Power Sensing Mo
320-1.6.9.3 Ground Fault Detec
320-1.6.10 ELECTRIC CABLES.
320-1.6.11 CABLE PENETRATIO
320-1.6.11.1 Metal Stuffing Tub
320-1.6.11.2 Nipples or Collars
320-1.6.11.3 Cable Segregatio
320-1.7 SYSTEM PROTECTION
320-1.7.1 GENERAL.
320-1.7.2 GENERATOR RE
320-1.7.3 SHORT-CIRCUIT
320-1.7.4 FUSES.
2. OPERATION
320-2.1 CHARACTERISTICS
320-2.1.1 GENERAL.
320-2.1.2 NSTM REFEREN
320-2.1.3 OTHER REFERE
320-2.2 GENERAL PRINCIPLE
S9086-KY-STM-010/CH-320R2
320-1.6.5.7 NLB Type. NLB circuit breakers are similar in construction to ALB breakers, but they do not have any overcurrent trip capability. These devices are used to break load by operating a manual toggle switch handle. They are designed for use on low voltage power and lighting distribution systems.
320-1.6.6 FUSES. A fuse consists of a metal conductor inserted into a tube of glass or other insulating material, that melts when the current through the conductor exceeds the rated level, opening the circuit. Metal ferrules at each end of the fuse make contact with fuse clips or contacts in the carriage of a screw-type fuse holder. Fuses are used as protective devices in power and lighting circuits. They are in some user equipment, where their performance is preferred over that of a circuit breaker or their use is considered more economical. Motors rated up to 7-1/2 horsepower (hp) are often supplied from group control centers having 30-ampere fuses. Fuses are not used in 450V circuits supplying motors in excess of 7-1/2 hp. Unlike circuit breakers, a fuse must be replaced when it fails. See NSTM Chapter 300 for directions on removing and replacing fuses.
320-1.6.6.1 Fuse Characteristics. There are three types of fuses with one of the following characteristics:
a. Characteristic A - normal blowing
b. Characteristic B - time lag (slow blow)
c. Characteristic C - very high (100,000 amperes) interrupting capacity
C fuses are used where the available fault current exceeds the 10,000 amperes maximum interrupting capacity of A or B fuses.
WARNING
If A or B fuses are used in an application requiring type C fuses, the fuse may explode, causing fire and personnel injury and equipment damage.
Find
Find What: fuse
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Match Case
Find Backwards
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SuperManual Query for "Fuse"

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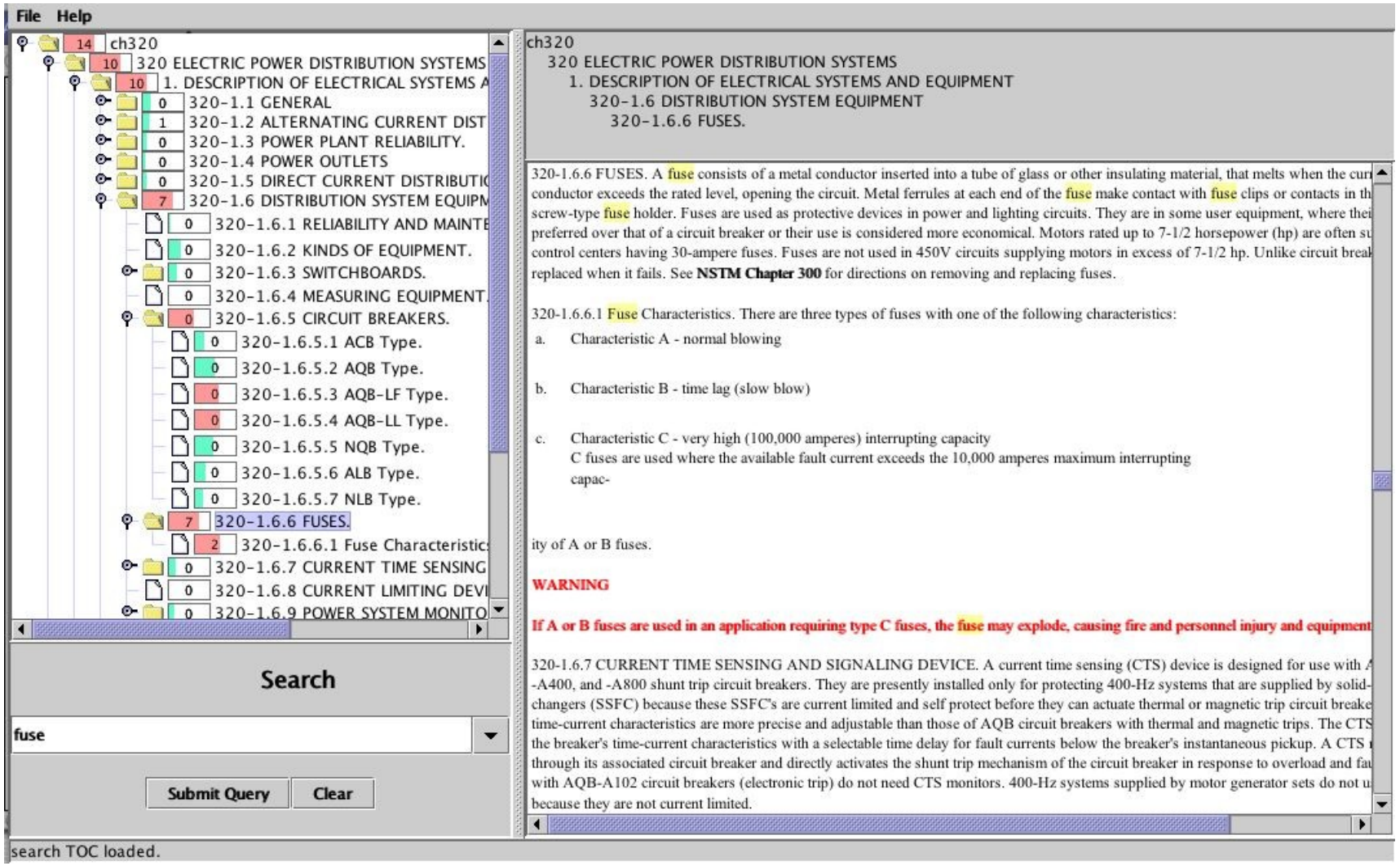
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10 320 ELECTRIC POWER DISTRIBUTION SYSTEMS
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1 320-1.2 ALTERNATING CURRENT DIST
0 320-1.3 POWER PLANT RELIABILITY.
0 320-1.4 POWER OUTLETS
0 320-1.5 DIRECT CURRENT DISTRIBUTI
7 320-1.6 DISTRIBUTION SYSTEM EQUIPM
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0 320-1.6.2 KINDS OF EQUIPMENT.
0 320-1.6.3 SWITCHBOARDS.
0 320-1.6.4 MEASURING EQUIPMENT.
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0 320-1.6.8 CURRENT LIMITING DEVI
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320-1.6.7 CURRENT TIME SENSING AND SIGNALING DEVICE. A current time sensing (CTS) device is designed for use with A
-A400, and -A800 shunt trip circuit breakers. They are presently installed only for protecting 400-Hz systems that are supplied by solid-
changers (SSFC) because these SSFC's are current limited and self protect before they can actuate thermal or magnetic trip circuit breake
time-current characteristics are more precise and adjustable than those of AQB circuit breakers with thermal and magnetic trips. The CTS
the breaker's time-current characteristics with a selectable time delay for fault currents below the breaker's instantaneous pickup. A CTS
through its associated circuit breaker and directly activates the shunt trip mechanism of the circuit breaker in response to overload and fau
with AQB-A102 circuit breakers (electronic trip) do not need CTS monitors. 400-Hz systems supplied by motor generator sets do not u
because they are not current limited.
search TOC loaded.

Natural Language Processing

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- Carnegie Mellon Speech Group Systems
  - Dragon/Harpy (1976) - large vocabulary recognition
  - Sphinx (1987) - speaker-independent continuous speech
  - ATIS (1991) - spoken language information retrieval
  - Speech Wear (1995) - wearable speech systems
  - Communicator (2000) - dialog-based problem-solving
    - Carnegie Mellon Communicator
    - Travel Planning
    - 1-877-CMU-PLAN
- Currently working with Symphony System

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Natural Language: Focus

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- Functional Focus
  - Shift hand-off
  - Multiple tasks and task interr
  - History access (part, procedu
  - Collaboration

- Research Focus
  - Automatic dialog generation from manuals to dialog
  - Mediated interaction
  - History and context integration
  - Summarization

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Wearable Computing

CM FNC

- Pentium 233 MMX processor
  - 64 MB RAM
  - 680 MB hard drive
  - 26 x 80 x 120 mm
- Head-worn display
  - IBM Watson Center
  - VGA resolution and view equivalent to desktop screen

IBM wearable concept m

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Wearable Computing

CM FNC

- Interact with speech
  - CMU developed speech for hands-free interaction
  - Gentex 100902 noise-canceling microphone
- Move into tight spaces
- Function in variable lighti

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QUESTIONS?

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